

Fig 5 The guide wire deviates from the 'horizon' by about 40 degrees, so there is foreshortening of its shadow in the lateral radiograph of about 1 cm

The practical implications of this are of some importance: it has been shown that the guide wire may have penetrated a distance of up to 1 cm beyond the position indicated by radiography. It is important to avoid the nail penetrating the articular surface of the femoral head. Not only will the joint surfaces be damaged but a painful hip may result, particularly once weight-bearing is permitted. The one puzzling feature is that some patients in whom one is aware that the tip of the nail projects into the joint are nevertheless free from pain.

Perhaps more important, though less common, are cases of slipping of the upper femoral epiphysis: it is the usual practice to secure the epiphysis by introducing several pins somewhat obliquely so as to grip the relatively small epiphysis in several separate areas. In these circumstances the chances of one or more pins being at some distance from the horizon in both planes is increased and the chance of the articular cartilage being breached is correspondingly greater. To avoid these complications it is necessary to assess the plane of the guide wire in relation to the horizon – particularly the lateral radiograph. Fig 5 shows a guide wire inserted at a steep angle. The angle of deviation between the guide wire and the horizon is about 40 degrees and the amount of pseudo-shortening is approximately one centimetre. This should be added to the apparent length of the guide wire in the lateral projection to obtain its true position. Angles of less than 15 degrees can be ignored as the distance concerned would be too small to be significant.

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Anterior Fusion of the Lumbar Spine: A Review of Twenty-four Patients

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This paper reviews the results of anterior interbody fusion in patients with backache due to chronic disc degeneration, spondylolisthesis and intervertebral joint instability.

Most conventional methods of fusing the spine utilize the posterior approach. This technique gives a good view of the dura and nerve roots and allows adequate removal of a disc prolapse. Access to the disc space itself, however, is poor and fusion is usually attempted by placing grafts between the spines, laminae or transverse processes.

Atkins (1955) reviewed the results of fusion of the posterior elements and suggested that the claimed fusion rates of 70–80% were far too optimistic. He abandoned posterior intercorporeal fusion because of the high rate of failure in his hands, claiming that there was some intrinsic factor peculiar to the bone of the vertebral bodies which prevented bridging of the disc space by bone.

In 1948 Lane & Moore approached the intervertebral space from in front using a transperitoneal technique. They recorded their experience of 36 patients who had undergone interbody fusion, noted the good exposure and mentioned the theoretical advantage of compression obtainable between the vertebral bodies. Their follow up was short and no conclusions could be drawn.

Harmon (1960) reported the results of anterior extraperitoneal interbody fusion in 250 patients.

He claimed bony fusion in 98%. Complications were low and the author recommended this procedure for all patients with lower lumbar instability.

Theoretical advantages of anterior interbody fusion: Fusion of a joint is ideally achieved by approximation and if possible compression of two broad cancellous bony surfaces. These conditions are only obtainable in the spine when intervertebral body fusion is carried out. The posterior approach to the disc space gives only a limited exposure so that complete disc removal is impossible. The anterior approach to the spine, however, allows a more complete removal of the disc material and the cartilaginous plates, thus exposing cancellous bony surfaces. This approach also gives sufficient exposure for the insertion of a large cancellous bone graft usually taken from the ilium which will be compressed by the natural forces of the spine.

Material: Twenty-four patients whose ages have ranged from 29 to 62 were reviewed. There were 12 men and 12 women. Symptoms had been present for eighteen months to twenty years.

All complained of recurrent attacks of low back pain, aggravated by bending and lifting. Eighteen also had occasional unilateral sciatic pain.

Clinical examination showed marked limitation of spinal movements in 18 patients with pain noticeably produced on extension and lateral flexion. Only 3 patients showed neurological abnormality, usually an absent ankle-jerk.

Operation was indicated for: (1) Spondylolisthesis, 4 cases. (2) Failed posterior fusion, 2 cases operated on for chronic disc degeneration. (3) Chronic disc degeneration, 18 cases, confined to one or two levels only and indicated radiologically by gross disc narrowing with marginal sclerosis and osteophyte formation.

Previous treatment: Five patients had had no previous treatment. Conservative treatment had been unsuccessful in 11 patients; 5 of these had manipulations. Laminectomy had been performed in 6 patients; in 5 a prolapsed disc had been found and removed with relief of sciatica; in one no lesion was found. Two patients had undergone previous posterior fusion for chronic disc degeneration but symptoms had persisted and the fusion was found to be unsound.

Twenty-two patients were operated on by an extraperitoneal approach, 2 by a transperitoneal approach,

Technique: A left transverse muscle splitting incision was used and the abdominal contents were reflected extraperitoneally. The L.4-5 space was exposed by gentle sponge dissection and medial reflection of the common iliac vessels. The lumbosacral disc was exposed between the bifurcation of the aorta. The disc space was prepared by careful removal of disc material and cartilaginous plates, exposing the cancellous surfaces of the adjacent vertebral bodies. The disc space was completely cleared. Cancellous chips were placed deep in the space and then a carefully shaped block of cancellous bone taken from the iliac crest was driven into the disc space so as to produce a tight fit.

The patients were nursed on a Stryker frame following operation. This period has ranged from three to ten weeks though the majority were nursed for six weeks. They were then mobilized in a high plaster corset which was retained for a further six weeks. The average in-patient stay was fifty-five days.

Complications (Table 1): In this series complications were high. Six patients (including both patients who had undergone transperitoneal operations) developed an ileus following operation. This was relieved by gastric aspiration and intravenous replacement therapy, a routine we now employ in every case for the first forty-eight hours. One patient developed urinary retention which was relieved by catheterization. A further patient had a mild urinary infection which responded to antibiotics. An exacerbation of sciatic pain was experienced by 2 patients; in one of these laminectomy was necessary two weeks after operation and a large disc prolapse was removed. In the other patient pain slowly subsided during immobilization on the Stryker frame.

Three patients developed incisional herniæ; 2 of these patients had developed post-operative ileus with vomiting and this was thought to be the causative factor. All these herniæ have been successfully repaired.

Table 1
Complications

	No. of cases
No complications	8
Ileus (requiring drip and suck; of these 2 had transperitoneal operations)	6
Urinary retention	1
Urinary infection	1
Exacerbation of sciatica	2 (1 required laminectomy)
Incisional hernia	3
Pain at iliac wound	2
Persistent paresthesia	1

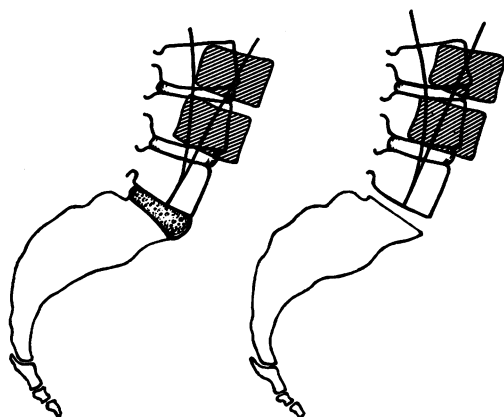


Fig 1 Fusion. Bony continuity across the space; no movement

Fig 2 Fibrous ankylosis. Graft not visible; no movement

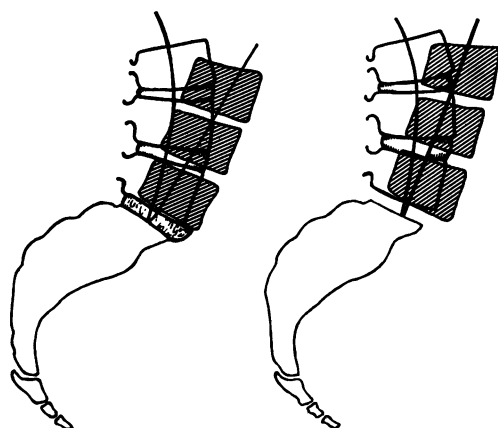


Fig 3 Graft visible, not continuous; movement occurring

Fig 4 Graft no longer visible; movement occurring

Two patients complained of aching in the iliac wound at the donor site of the cancellous graft and one patient had persistent paræsthesiæ in the distribution of the lateral cutaneous nerve of the thigh.

Results: All patients have been examined and X-rayed at least twelve months after operation, the average follow-up period being eighteen months. They have been assessed clinically, radiologically and by their personal opinions.

Clinical assessment has been based on the ability of the patient to return to his previous occupation without pain. In some cases a surgical corset has been worn continually since operation.

Seventy per cent of patients returned to their previous occupation with or without some pain.

Table 2

Results: radiological assessment

	No. of cases.	%
Fusion (graft visible – no movement)	15	62.5
Fibrous ankylosis (graft not visible – no movement)	2	8.3
Graft visible – movement	6	25.0
Graft not visible – movement	1	4.2

Table 3

Results: patients' assessment

	No. of cases	%
Better	17	70
Same	5	22
Worse	2	8

Six returned to a lighter job. One was still not working as he did heavy manual work.

Radiological assessment was based on two criteria: visible incorporation of the bone graft and absence of movement between the two vertebrae as judged by lateral films taken in flexion and extension. These were sometimes difficult to interpret as the quality of lateral films varied considerably. The results were divided into four groups: (1) Fusion – the graft being visible, incorporated and no movement present (Fig 1). (2) Fibrous ankylosis, no movement but graft not visible or hardly visible (Fig 2). (3) Graft visible but movement present (Fig 3). (4) Graft not visible, movement present (Fig 4).

Fifteen patients showed radiological fusion. A further 6 had a fibrous ankylosis (Table 2).

Seventeen patients felt that they were better and were pleased to have had the operation. Five patients were no better and no worse. Two patients however, thought they were worse after the operation (Table 3).

Conclusions: The results in the 24 patients studied show that they are no better, perhaps even worse, than those achieved by the conventional posterior fusion and that the complications are high. It would seem that the place for this procedure should be reconsidered despite the optimistic results reported by other authors.

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